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ORGANIC GARDENING

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J. I. Rodale, Editor Sir Albert Howard, C.I.E., M.A., Associate Editor

With The Editor

EARTHWORMS

A chapter from the forthcoming book "Introduction to Organic Farming and Gardening" to be published by the Devin-Adair Company, New York, N. Y.

AN earthworm-worked soil will absorb a two inch rainfall in fifteen seconds due to its porous consistency and sponge-like structure whereas its neighboring clay soil takes sometimes as long as two hours for the same amount to sink in. Every earthworm burrow hole is a watering tube.

These subterranean workers aerate the soil, which permits the much needed air to penetrate to the roots. It oxidizes and nitrifies the earth. It dissolves the soil and makes it soluble in the water that carries the food to the plant roots. I have seen an earthworm take a fairly good-sized globule or tiny clod of earth and watch its passage through its body.

It draws leaves and other green matter below the surface, much of which decays and enriches the soil. Many roots use the long tunnels as a means to get to lower levels. As these tunnels are lined by the worms with a fertile liquid form of cast, the roots benefit accordingly.

As the life of the earthworm is a bare year or two, their dying and decaying bodies furnish a substantial amount of fertilizer each year. The worms have a very high nitrogen content as well as a potent oil which immeasurably enriches the soil. Some of the earthworm breeders claim that persons with eczema of the hands have cured it by running their hands in the soil of the earthworm boxes which seem to be impregnated with this oil. The California Earthworm Farms have placed on the market a colorless and odorless oil which they obtain from these creatures of the dark, which has great penetrating power and many medical uses.

Earthworm castings are the finest form of humus known. At the Connecticut Experimental Station it was found that the nitrogen in these castings is almost five times greater than in the ordinary topsoil, the phosphate seven times greater, potash eleven times and magnesium three times. California florists pay a high price for earthworm castings.

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They report this material as the best they have ever been able to secure for raising flowers. Experts from Great Britain have estimated that in the intensive six-months cotton growing season, following the overflowing of the Nile, earthworm castings amounted to almost 120 tons per acre. This is more than eight times the figure given by Darwin and would seem to indicate an earthworm population of about 1,500,000 an acre. This gargantuan quantity of worms is made possible by the organic material (their food) which the overflowing Nile deposits on the land.

Darwin's figures of the number of earthworms per acre were very conservative. In Ohio, Government investigators found 1,000,000 worms per acre on bluegrass pasture. Here the topsoil was over eighteen inches thick whereas Darwin in England found the upper laver of rich soil where he conducted his researches only five or six inches. Government investigators in Oregon found earthworm populations from 500,000 to 1,500,000 per acre.

There are over 1100 species of earthworms but for our purposes we need consider only two. This group doesn't include cutworms which are really caterpillars. Nor do they include grubworms which are larvae of insects such as beetles. They do not include the parasitic nematodes which are thread-worms or round-worms and are so small that they are barely seen by the naked eye. Eelworms are in the same class.

We are concerned mainly with two types of earthworms. The bluish, long thin type which works in the soil and the smaller, thicker reddish type which lives on fresh manure and in compost heaps. The blue, soil type earthworm will not thrive in a compost heap and vice versa. When a heap is first made no earthworms will be seen. They soon begin to propagate (the red type) and when the heap turns to humus they die and decay. Where incomplete compost is spread on the land any of the red earthworms in it will die. The blue earthworm works on organic matter in the soil and turns it into humus. Sometimes when a compost heap is in the final stages the blue earthworms may migrate into it.

Where strong chemical fertilizers are used conditions distasteful to earthworms arise and their numbers decrease to the vanishing point. Ammonium sulphate, a fertilizer that is extensively used by farmers, is particularly harmful to these soilworkers. The U. S. Government itself acknowledges this fact by recommending ammonium sulphate as a specific where earthworms are to be killed off. This applies to putting greens of golf courses. The following, from U. S. Dept. of Agriculture Farmer's Bulletin No. 1569, gives more information on this point:

"The results of three years' application of ammonium sulphate to sod on the experimental farm of the Department of Agriculture at Arlington, Va., for fertilizing purposes, have shown incidentally that earthworms were eliminated from the plots where this chemical was used. When applied to soils which are naturally neutral or slightly acid in character, this fertilizer creates a strongly acid condition that is distasteful to the worms, and they disappear."

Many other chemical fertilizers are slowly but definitely killing off the earthworm population. This was proven at the Research Laboratory at Dornach in Switzerland. The experiments there showed that earthworms did not like soil saturated with artificial fertilizer and if given an opportunity chose earth fertilized with bio-dynamic compost, in preference even to soil that was not fertilized at all.

Strong insect sprays containing lead, arsenic or copper, lime sulphurs and tar oil, etc. are even more destructive of earthworms. In tracts of potato-growing land where much of these sprays are doused periodically on the land, nary an earthworm can be found. What is equally as bad is the fact that much of the bacteria population is adversely affected. The result is that the soil becomes almost sterile and the farmer is working in a dead medium. Therefore, each succeeding year requires the use of progressively more spray and more chemical fertilizer to get the necessary yield.

Likewise in vineyards or orchards which have been intensively treated with sprays for many years, no earthworms are to be found. In such places the earth becomes hard-packed and extremely difficult of cultivation. Birdlife will move away because of the lack of their usual food, the earthworm, and the land will suffer further because birds destroy fabulous amounts of noxious insects and their larvae. As we have seen in the previous chapter these beneficent worms also destroy harmful organisms in immense quantities.

The boring into the soil of earthworms increases the porosity and aeration of the soil. This is of great aid to other

kinds of soil life, such as bacteria, for example. In well-worked soil there is to be found about 600 pounds of bacteria to the acre. Where earthworms are absent the bacteria population greatly decreases, to the serious detriment of the soil's fertility. Bacteria is a potent factor in the formation of humus. It gives the soil the power to quickly digest organic matter. Place a piece of burlap on top of soil that is saturated with bacteria. It will be eaten up by the soil and completely disappear from the surface in a few months. Do the same thing on land strongly chemicalized and sprayed. It will remain for years. That type of soil has lost its natural powers of digestion.

Where any one item in Nature's cycle is disturbed it will be found that others are automatically affected. Nature consists of a chain of conditions, interrelated and interlocked. Remove any one factor and you will find that she cannot do her work efficiently and becomes less friendly to man. It never fails.

The question is often asked, do earthworms eat the roots of plants, especially the fine root hairs? So long as there is humus or organic matter present there will be no eating of roots. Where the farmer or gardener permits the soil to become so sterile of organic matter that the earthworms in desperation turn to the roots for sustenance, there will arise also other more evil consequences. On the other hand, where there is sufficient compost in the soil, by a combination of action between the earthworms and the compost, the root growth will become very vigorous and the number of fine hairs thereon will far outnumber those on plants growing in a soil that contains less organic matter.

Earthworms can work in any kind of soil, even clay, but in that case it will take longer for the worms to cultivate it thoroughly. Ordinary earthworms will thrive only in the kind of soil they are born in. In taking some of these creatures from a sandy soil and transplanting them to a very heavy clay loam, most of them will die off. Where earthworms are bred in boxes from a strain of worm that has long lived in captivity, it will be found that they will live in almost any kind of soil.

Too much acidity or alkalinity has a harmful effect on them. Therefore one must be careful not to overlime the land. Excessive minerals and fresh manure in a state of putrefaction are extremely distasteful to earthworms.

In the winter time when the ground is frozen, the earthworm's activity is considerably decreased, but undoubtedly continues below the frost line.

J. I. Rodale

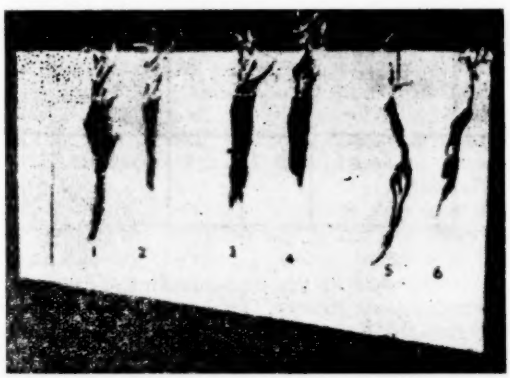
Frost and Drought Resistance

BY LADY EVE BALFOUR

(News Letter on Compost. England)

September 10, 1943.

THE accompanying photograph illustrates the results of an experiment that I carried out last winter. This experiment was not originally designed as a test of root responses; but, as so often happens in experimental work, some incidental, or secondary, result crops up which overshadows the original intention.



It must be borne in mind

that the root responses here illustrated were the outcome of an isolated experiment; but I thought them, nevertheless, sufficiently interesting to be worth recording, and it occurred to me that they might also interest readers of the News Letter, since they provide a convincing explanation of the frost and drought resisting capacity of humus-grown plants.

The inch scale on the left of the photograph runs from one to seventeen inches. The root specimens numbered 1 and 2 are of winter wheat; 3 and 4 of a winter sown mixture of oats, tares and peas; 5 and 6 of winter beans.

All specimens were sown in the autumn of 1942 as part of a field crop, six fields—corresponding with the six specimens—being involved. In December, 1942, a few of the young plants, chosen at random, were transferred to pots, still, of course, in the soil in which they were growing. Each pair of pots (those containing the same variety of seedlings) held the same number of plants. The pots were kept in a greenhouse all winter, and watered with rain water.

In June, 1943, the top growth was cut off, the plants were removed from their pots, and the soil carefully washed away from their roots.

The three fields from which the right hand (short rooted) specimens were taken (numbered 2, 4, and 6 in the photograph) each received chemical fertilizer at the time of sowing in October, 1942.

None of the fields from which the left hand (long rooted) specimens were taken (numbered 1, 3 and 5) received any manure of any kind in 1942, but the previous treatment was in each case organic.

Here is the complete analysis of the treatments and previous cropping of these six fields:—

Specimen No.	1943 Crop	1943 Manure	1942 Crop	1942 Manure	1941 Crop	1941 Manure
1	Wheat	—	Beans	Sheet compost	Grass	—
2	Wheat	Ammoniated Bone limphos 5 cwt. per a.	Clover	—	Barley	—
3	Oats and Tares, etc.	—	Barley	Sewage Sludge	Grass	—
4	Do.	as 2	Barley	3 cwt. Limphos 2 cwt. 3S04	Grass	—
5	Beans	—	Wheat	—	Fallow, following a composted kale crop fed off by sheep in 1940	
6	Beans	as 2 and 4	Oats	Basic Slag and Nitro Chalk	Green crop fallow sheep fed.	

It is noteworthy that in the pair in which the least difference in root growth is observable, namely 3 and 4, the organic treatment of 3 was not humus, but raw sewage sludge. Even here root growth is greater than in the case of its chemically-grown equivalent, but the amount of the difference is nothing like so great as in the case of the other two pairs of specimens where the organically-treated plants received compost, even though, in the case of No. 5, the last compost treatment dates back to 1940.

Yours sincerely,

E. B. BALFOUR.

Is Any Soil Really Poor?

A sensational discovery which corroborates the theory of Organic Farming.

BY J. SIDNEY CATES

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THIS is another chapter in the story of our present-day theory—or lack of theory—about soil productivity. Vast as have been the studies on what makes one soil produce while another falters, we have yet to nail down all the factors. There still remains an elusive mystery. And I am setting forth in this article, as a case in point, the manner in which the dread root rot of cotton has been conquered. This long-threatening and in many cases devastating menace to cotton in the Southwest seems on the way out. Thereby lies one of the most fascinating tales in agriculture, one that seems to involve the ages-old mystery of what makes land productive.

As you doubtless know, this generation-old and constantly growing curse of the Southwest cotton industry has been the subject of the most profound and exhaustive study by many groups of agricultural scientists. Millions of dollars have been spent in a hunt for a remedy. And through the years the toll farmers have paid through no worth-while harvest coming to reward their summer's effort has run into hundreds of millions of dollars.

Little has been said about this new cure for root rot. Perhaps this is because the remedy, in its outward respects, is so very simple. But its powers for good are based on highly complex action in the soil that could well be overlooked. Thus the simple cure, a sort of home one, has been lying around waiting to be recognized all the time the root-rot curse has been on the rampage and under scientific scrutiny.

Let me hasten to name this remedy, and then I will sketch its fascinating background and attempt to project some of its implications.

The cure for root rot of cotton consists in nothing more than turning under leguminous organic matter in the fall or spring before the cotton crop is planted. A heavy dose of stable manure will effect the same end, though the latter is seldom available in sufficient volume to be a large factor under most root-rot infested cotton-farm conditions. But this leguminous-organic-matter treatment of cotton soils has long been known to be highly profitable, even when no root rot is present.

It is only when we get into the method whereby the nitrogen-filled organic matter in the soil overcomes the dread root-rot fungus that the breadth and scope of the discovery stands out. It is not through the chemical action of this rotting material that the cure is brought about. *The answer lies in the fact that teeming bacteria in the soil, these bacteria no doubt embracing thousands of strains, take on renewed life under the stimulation of this, their seemingly pet food supply.* Some of these stimulated bacteria strains are dread enemies of the root-rot fungus. The bacteria not only destroy the fungus on contact, presumably like certain bacteria destroy our own body tissue, but the antipathy between these two organisms goes much further. In artificial-media cultures the root-rot fungus dies even on the approach of the enemy bacteria growth.

The discovery leading to its control comes from C. J. King, Superintendent of the U.S. Department of Agriculture field station at Sacaton, Arizona. King observed one summer in a section where alfalfa had been grown, and in another section where stable manure had been

added, that there was little or no root-rot damage, while alongside, to the very sharp margin of where these treatments had been given, the cotton crop was almost devastated by root rot.

It is common knowledge that stable manure, or leguminous organic matter, is good for growing plants. But why should these materials be harmful to a fungous pest of plants?

Good Bugs Fight Bad

King finally made a shrewd guess as to what was happening. He guessed that the bacterial growth there in the soil contained in its many kinds some sort or sorts that were, under this stimulation of stable manure or leguminous matter, simply playing havoc with the dread root-rot curse. He retailed this guess with much enthusiasm to his Washington Bureau Chief. King himself is not a bacteriologist. But he asked for a bacteriologist to work under him and try to isolate from the soil the particular bacterial strain that was chewing up the root rot.

King got his bacteriologist. They sent him out a rather inexperienced young man, John T. Tresley. Maybe that was lucky, for a better-trained older man would, I believe, have laughed at the whole concept, and would have dubbed the task of finding such a specific germ, and isolating it from the billions of other germs there in the soil, as utterly fantastic.

But in an amazingly short time Tresley found just what King set him to hunt for. It was a bug that would kill the root rot not only in artificial culture media, but also when poured on sick cotton plants growing in soil.

A number of years ago I told this part of the root-rot story to Country Gentleman readers. I put it forth as a new principle in agriculture, that of setting the good microscopic life in soils to fighting the bad. I hesitated at that time to go very far in putting forth the discovery by King and his coworker as a panacea for root rot, because we had not yet found out that the good bacteria that would jump on root rot so ferociously were to be found in all cotton root-rot soils. And then, too, in most of the worst root-rot cotton regions, not only is stable manure a relatively scarce article, but leguminous crops were also devastated by the root-rot pests. When Dr. Charles Thom, head of soil bacteriology studies for the USDA, at a later date, did suggest to Texas the use of legumes in the fight, he was met with the protest that legumes would harbor the disease and only add to the trouble.

But today it seems to be a well established fact that these good germs are everywhere present, and only need to be fed by legumes that they may multiply into teeming armies capable of doing the control job. Winter annual legumes can be grown throughout most of the root-rot region. *Millilotus indica* and Huban sweet clover, fall planted, make their growth when the temperature is too low for the root fungus to be very active. Certain varieties of cowpeas are showing high root-rot resistance when summer grown, even in the worst root-rot areas.

But this new and successful root-rot control method—that of altering the soil microbiology by feeding it with decaying leguminous material — is far bigger than the mere announcing of the abatement of a curse to Southwest cotton, devastating as the curse has been. To my mind the findings point to the clearing up of a veritable miasma of confusion about this whole subject of so-called "soil fertility." I loathe that term as inadequate and confusing.

"Fertility" is a chemist-proffered term. The word "productivity" gives the realistic picture to the practical farmer. For years we have been twiddling over the proper proportion of NP and K and more recently over so-called trace elements, while the understanding of the broad phases of the soil-productivity mystery is not only confused, and unknown, but grossly neglected.

We are still without an explanation of how a few of the colossal soil-building crops do their jobs. For more than a decade now we have had corps of experts running up and down the country and studying census statistics and living conditions for different areas, and labeling land as marginal or submarginal. If these same sociologist-economists would oftener take their question to any modern trained crop man, they would be told of a simple way to transform a great part of these so-called marginal lands into productive acres. And transforming land, so simply, is a much easier task than transferring people.

Soil-Building Mystery

The transformation of poor land into rich land which the crop men have worked out ties in with the mass and quality of organic matter produced by these soil improvers. But I have never yet found a philosophical-minded agronomist who would venture to say he understood just how the soil-

improving crop had done its colossal job. The method of conquering cotton root rot, however, gives another clue.

The late M. A. Crosby, of the U. S. Department of Agriculture, reported years ago that one sweet-clover crop would boost an old cropped-down Corn Belt farm from a thirty-five bushel corn yield level, back to more than seventy bushels. Later, R. M. Salter, now head of the Bureau of Plant Industry at Washington, found several years ago when with the Ohio Experimental Station, that one crop of sweet clover planted on raw clay from which all top soil had been removed, transformed this clay into better than fifty-bushel oat-yielding land. Mooers, of Tennessee, found that corn on an old *sericea lespedeza* sod responded with a yield stepped up from a pretreatment normal of thirty bushels to a new outturn of between seventy and ninety bushels to the acre. The vast scope of the improvement in productivity in these Mooers experiments has apparently stunned the old "soil fertility" students into an avoidance of consideration of what has taken place. The Mooers facts simply do not fit into any old orthodox concept of "soil fertility."

Another line of observations seems also to tie in with the successful use of leguminous vegetable matter for the prevention of cotton root-rot damage. I am referring now to the beneficial effect of so-called trace elements used as fertilizers. We have assumed that these elements are minerals needed for plant nutrition. Now there develops strong evidence that, in many cases at least, trace elements affect plants merely through action on soil bacteria.

Iodine a Factor

A recent experimenter found that alfalfa got a big growth kick from a small amount of iodine. Further studies indicated that the iodine had no effect directly on the alfalfa, but did greatly stimulate the inoculating bacteria.

Several years ago C. L. Willis, of the North Carolina Experiment Station, found that either one of a half-dozen trace elements gave measurable crop stimulation when applied to certain Eastern North Carolina soils. The fact that applying just one of these elements had the same effect as applying several or all of them is pretty clear indication that they did not represent a so-called plant-food deficiency.

There are several observations that symptoms of boron deficiency tend to disappear when plentiful organic matter is added to the soil.

We are just coming through a notable era of re-evaluating the land resources of America through plant breeding. We have learned how to build new plant varieties immune or highly resistant to disease. This development has vastly expanded the areas adapted to the commercial production of certain crops. We have also learned how to utilize hybrid vigor. But these better crops need better lands to show their full wares.

The next big job for our agriculture is the job of soil building. Poor land always curses the man who plows it, but its curse is particularly bitter during high-cost eras. We have been looking at this poor-land menace from entirely too narrow a standpoint, with apparently too orthodox and unbending academic theories. Theory seems 'way behind empirical discovery. And our scientists have been to reluctant to face the fact that there has long been a mystery about what leguminous organic matter does to effect its enormous push-up of soil productivity.

The discovery that leguminous organic matter, decaying in the soil, breeds virulent strains of bacteria which destroy the cotton root-rot fungus, ties in with and serves to somewhat clarify the whole hazy concept of what factors may make for soil productivity. Isolated cases are rare, and perhaps non-existent in nature. Everything tends to fall into a pattern. Perhaps there are thousands of unrecognized strains of crop-growth-inhibiting fungous organisms that are similarly destroyed when one of these colossal soil-improvement legumes is doing its land-enriching job.

Hints For The Victory Gardener

This is the fourteenth of a series of articles by this author dealing with the cultivation of ordinary vegetables

By Roger W. Smith

ONIONS

GARDENERS have grown onions since ancient days. Egypt, in the days of the Pharohs, was famed for the mildness of its onions. As soon as you decide to grow a few rows of onions you will be confronted with the problem of choosing between the great number of strains available. You take your pick from an array that extends from the satiny, globular-rooted "Bermuda" type to the pungent little garlic onion; from the very mild, thick-stemmed leek to the homely shallot.

Onions are relatively easy to grow provided the garden soil is rich, fertile and reasonably well drained. The top soil should be deep and contain an ample supply of organic humus. If the soil is exceptionally sandy or very heavy (clayey), this condition should be corrected the season before planting by the addition of well-rotted horse manure, leaves, or other organic material deeply dug in.

The use of lime may be necessary to offset excess soil acidity. If finely crushed limestone is used this may be incorporated in the soil at any time previous to planting. Hydrated lime is most effective when raked into the surface of the garden after digging has been completed. During the digging and pulverizing of the area in which the onions are to grow a generous application of fine compost humus should be made.

An easy way to become familiar with onion growing is to start by using sets. Sets are small seed onions commonly of the Ebenezer type, although they come in white-, brown-, or red-skinned varieties. The best sets to plant are those about the size of a dime. Those smaller than that are usually lacking in vigor. You will find that it pays to plant sets carefully in their natural position, two to three inches apart in the row. They should be covered with a quarter of an inch of sifted compost humus, watered and well firmed. One pound of sets is enough for fifty feet of row.

Sown as early in the spring as possible, the sets will grow rapidly. They demand only shallow cultivation and necessary weeding. By five weeks the young plants should have made good growth. If pulled at this stage they are known as "scallions" or "early green bunching onions."

Onion sets mature in about one hundred days and as the plants approach maturity you will watch them with interest. Gradually the tops fall to the ground. When most of the tops are down the remainder are generally broken down by running the back of a rake over them. A day or two later the onions should be pulled and left on the surface of the ground for a couple of days to receive the drying, curing effect of exposure to sun and air. They are then gathered and the tops clipped off about an inch from the bulb. To complete their curing they should be spread loosely in a shed or airy leanto where they may remain drying until cold weather arrives when they should be placed in orange crates, net bags, or similar open containers and moved to a cool, dry storage cellar. Lacking a storage cellar, onions in open containers may be stored in

some well ventilated place such as an attic. Provided they are dry, slight freezing does not injure them although they should not be handled while frozen.

Your success in growing a few bags of fine smooth onions might cause you to wonder how this satiny bulb came to be formed. In this connection, it is well to remember that though the health of the plant itself depends upon the liberal use of plant nutrients supplied by organic humus, good drainage and the like, the formation of the onion bulb is determined by the length of the daylight. The time when the formation of the edible bulb forms is determined by the amount of daylight the plant receives and not because of the maturity of the plant.

This explains why some types of onions form bulbs in certain localities and not in others. There are onions which form bulbs when receiving only twelve hours of daylight daily (Yellow Bermuda, White Creole, etc.). Ebenezer, which you planted, and Yellow Danvers require thirteen hours of daylight each day to bulb. Such types as Red Wethersfield require as much as fourteen hours. Thus, in the growing of a few rows of onions you have been introduced to the important and often ignored part light plays in plant growth.

Onions grown from seed mature in about a hundred and thirty days but offer you a much wider range of varieties than those grown from sets. One ounce of seed is sufficient for one hundred feet of row. Seed should be in the ground just as early as possible, even before danger of frost has passed. It should be planted thickly and evenly in a shallow drill and covered with a half inch of sifted compost humus and firmed. Careful weeding of the rows and the same general care should be given as for onions grown from sets.

Because of the necessity for an early start so that the plants may be benefitted by the long daylight hours and mature before the arrival of summer drought, many gardeners purchase young plants. But to obtain fine young plants, true to type and free from disease, you may decide to grow your own seedlings with the aid of a cold frame. You will then be in a position to transplant the seedlings to the garden the minute the ground is in a condition to receive them.

From globe onions you shift your attention to leeks. Leeks deserve a much more prominent place in the average vegetable garden. They are quite easily grown, mild-flavored, and very bulky. They have much the appearance of giant scallions with stems over two inches thick on plants reaching almost a foot high.

Leeks will thrive under about the same conditions as globe onions. The seed is planted thickly in the same manner. However its culture, after the plant reaches eight inches high, is quite different from that given the globe onion. When the plant has reached this height the tops are cut back to about four inches high. A new area for them is prepared and a furrow five inches deep formed. The plants are then dug and carefully transplanted to the furrow in the bottom of which they are planted five inches apart and well watered. If another furrow is necessary to receive all the plants you have grown it may be formed parallel with and two feet from the first.

This shifting of the plants is done to give them more room and so that, as they grow, the sides of the furrow can be gradually broken down with a hoe to encourage the formation of long, thick stalks. This blanching of the stalks also makes them finer and crisper.

Quite different from either the globe onion or the leek is the garlic onion and the shallot. A very small planting of garlic will be adequate for the production of sufficient garlic "cloves" needed by the average family.

Garlic is usually grown from sets. The sets in this case are sometimes called "mother onions". They are really a cluster of "cloves" — more properly bulblets — held together in a membranous papery sac. At planting time the "mother onion" is separated into its component bulblets which are planted four inches apart in the row and covered with a half an inch of good compost humus. The rows are usually eighteen inches apart, although you will likely find that one short row is more than enough.

Because of its persistence, garlic sometimes becomes a serious weed, yet if you plant a few of the "cloves" you will meet a truly fascinating plant. Garlic grows in the wild and it is not unlikely that many of the varied types of cultivated onions were developed long ago by ancient peoples from such wild forms.

In garlic you will meet a plant that increases and multiplies through the "mother onion" i.e. a soft-shelled bulb around which grows a number of hard-shelled bulblets all of which are ready to form a new plant. The plant also forms aerial bulblets that is, a cluster of small bulbs at the top of a stalk some two feet tall. Each

of these aerial bulblets is capable of forming new plants. In addition, of course, the plant flowers and forms viable seed. Two types of onions are grown as ornamentals because of the beauty of their flowers.

The shallot is an onion of the garlic type although it forms bulbs much larger and much less pungent. It is grown from sets in the same manner as garlic. Multiplier onions of the Egyptian type are often used as shallots. The shallot differs also from the garlic onion in that the "mother onion" is not held together by a papery sac. Altogether, the shallot is a sturdy, delightful garden plant, not too well appreciated. It is very resistant to plant disease and insect pests and for this reason much interest has lately been taken in work being done to cross this resistant plant with the more delicate, large bulbed onion types.

The average garden-grown onion is relatively free from plant disease and insect pest although the onion root maggot can be troublesome in some localities until the garden soil has been properly conditioned by the liberal use of properly composted organic humus. As an emergency measure some gardeners have found that radishes interplanted between rows of onions act as a very satisfactory trap crop. The onion root maggot prefers the radish root. They infest these to the exclusion of the onion roots, and the radishes are easily pulled and destroyed when they become infested.

Mankind from the very earliest days of recored history proclaimed the healthful qualities of the onion. This was until quite recently considered a matter of superstition although during Civil War days the onion was proclaimed a specific cure for the dreaded scurvy. Apparently the food value of the onion was slight although it seemed to have a peculiar ability of accentuating other flavors. This was considered its sole value until recent scientific investigation showed that the onion contained an aldehyde which was apparently capable of entering the bloodstream of the one who ate it and acting as a killer of disease bacteria.

So, after you have harvested your crop, whether it be a few bunches of thick, white-stemmed leeks or a comfortable supply of large "Bermuda" type onions, you will likely ponder over the little labor these cost you and the great entertainment the proper growing of them gave you. Above all you will realize the great value they represent in the maintenance of the health of yourself and your family.

An Interesting Case

THERE is a delightful account in the New Yorker magazine (issue of Jan. 1, 1944) in the feature called PROFILES of a Scotch-Irishman named Hugh G. Flood, a wealthy retired old fellow of 93 who claims he is going to live to be 115. He is in the full possession of all his faculties which he attributes to his unusual diet. This consists almost exclusively of fish. He calls himself a seafoodetarian.

"Fish," he says, "is the only grub left that the scientists haven't been able to get their hands on and improve. The flounder you eat today hasn't got any more damned vitamins in it than the flounder your great-great-granddaddy ate, and it tastes the same. Everything else has been improved *and* improved *and* improved to such an extent it ain't fit to eat. Consider the egg. When I was a boy on Staten Island, hens ate grit and grasshoppers and scraps from the table and whatever they could scratch out of the ground, and a dish of scrambled eggs was a delight. Then the scientists developed a special egg-laying mash made of old corncobs and sterilized buttermilk, and nowadays you order scrambled eggs and you get a platter of yellow glue, Grade A. Consider the apple. Years ago you could enjoy an apple. Then the scientists took hold and invented chemical fertilizers especially for apple trees, and apples got big and red, and shiny and beautiful and absolutely tasteless. Might as well chew the brim of your hat. As for vegetables, vegetables have been improved until they're downright poisonous. Two-thirds of the population has the stomach jumps, and no wonder."

For over fifty years he has eaten nothing but fish, a little bread and butter and sauces.

British Farming—Nutrition Research

BY DR. CHALMERS WATSON (Retd.)

Consulting Physician, Royal Infirmary, Edinburgh,
Hon. Fellow, Edinburgh Veterinary Medical Society.

Reprinted from "Scottish Farmer" Nov., 1943.

SPECULATION is now rife amongst agriculturalists as to the main principle on which the Government's new policy is to be determined. A question of outstanding importance to the industry is whether the future policy is to be very largely determined by reference to the "Nutrition theory," whereby the industry would concentrate on the production of so-called "protective" foods, *e.g.*, milk, eggs and vegetables, which can be largely produced in this country, leaving other foods, *e.g.*, wheat and meat, to be imported from other countries where they can be produced more cheaply. While all will agree that it should be our aim to make home production meet nutrition requirements as effectively as possible, many will, on reflection, contend that in the present state of knowledge great care is necessary in using the "protective foods" theory as the too complete foundation for a new agricultural policy.

More attention is now being given to the health of the soil and how it should be maintained if the maximum amount of protective substances is to be present in the food grown for man and animals. This comparatively new line of thought was instructively presented in a query in the recent Presidential Address of the Scottish Sanitary Association by Dr. H. Rae, Aberdeen: "May there be a greater degree of correlation than we have hitherto suspected between the health of the soil, the quality of health of the crops grown, and human health?" The highly suggestive pioneer work of Sir Albert Howard is called to mind by this query, and the various issues raised by it merit much attention at the present time.

NATURE'S CYCLE — The Soil, the Plant, the Animal, and Man.

A fertile soil is unquestionably the basis of agricultural prosperity. Fifty years ago some classical research work was recorded in the "Clifton Park Experiments" by a famous Scottish farmer, Mr. R. H. Elliot, who devoted much attention to deep rooting plants (grasses), which convey from the air into the deeper soil the nitrogen required for the full maintenance of its health, and the production of the maximum amount of fresh living food. Elliott, however, was a man before his time, and his work passed too largely into the limbo of the unrecognised and the forgotten. His great British successor, Sir George Stapledon, in "The Way of the Land," well points out that insufficient attention has been paid to the teaching of Elliot, who, as a practical agriculturalist "beginning to realise that our chessboard system of farming was played out, wrote convincingly on the basis of his actual experiments." Sir Albert Howard's pioneer researches on the soil have a definite bearing on the excellent work of these two great practical agriculturalists and researchers.

In his capacity as Imperial Economic Botanist to the Government of India from 1905 onwards, Sir Albert Howard had the opportunity of studying diseases induced by various fungi and pests, and he, rightly or wrongly, came to the conclusion that insects and fungi are not the real causes of plant diseases, but only attack unsuitable varieties or crops imperfectly grown. He studied the diseases of crops grown in a way of which he disapproved; he later acquired facilities for growing crops in his own way, in time increasing the limited amount of farmyard manure normally available *by the production of compost manure from decaying vegetables and animal residues converted into humus.* His new teaching, indeed, is essentially based on the formation, the use and the value of additional organic manure in the form of "compost," which, from long extended experience he regards as greatly superior to the modern artificial manures extensively used for (*a*) the maintenance of the health of the soil, (*b*) the production of healthy crops free from disease

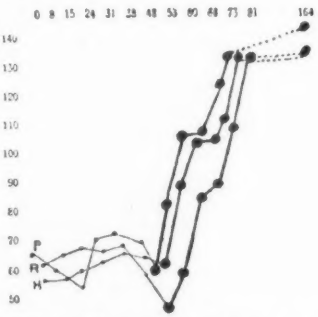
and (c) the special quality of the foods obtained for the sound nutrition of man and animals. He contends, and many will agree with him, that the mere "chemical" composition of food, even after including its elaborate analysis for "vitamins," cannot be regarded as conclusive of its real value, the "biological" value of a food being more elusive, and not yet capable of being fully ascertained by any known laboratory methods. I commend to my readers the concluding sentence in an appreciative Editorial Note (Professor Dalling of Weybridge) in the *Veterinary Journal* of March 1943 on Sir Albert Howard's paper in that issue on "A New Policy for Veterinary Science": "To some Sir Albert Howard's views may be new, others may contest them, but they merit the most careful consideration of all."

A considerable amount of independent testimony to the value of Sir Albert Howard's teaching is already available from many quarters (South Africa, New Zealand, and U.S.A.) amply sufficient to justify the plea that appropriate research should be carried out in this country to confirm, or otherwise, his teaching. Two correlated questions are associated:—

1. The existence of a "vital" property in food which is not fully revealed by skilled laboratory analysis?

2. Whether, while recognising the value of "artificials" in crop production, the great reliance on artificial manures in common use insidiously impairs the health of the soil, predisposes to disease in the plants, with a resulting unfavourable influence on animal nutrition and the resistance of animals to disease, with, in sequence, a similar impairment in human nutrition and resistance.

The first of these questions cannot be lightly dismissed by the mere assertion that the existence of such a vital property is unknown and unthinkable.



The influence of a bread and skimmed milk diet on young rats previously fed on an abnormal dietary. The curves represent the weight of three young rats that were fed on porridge, rice, and horse-flesh respectively for six weeks, and were then (forty-eight day) transferred to a bread and skimmed milk diet.

A "VITAL" *v.* "CHEMICAL" FACTOR.

The existence of a "vital" function and "vital" property in foods was strikingly suggested to me forty years ago from the results of an extensive series of investigations on nutrition, which extended over many years, in which many qualified researchers took an active part, the term "vital" being defined as "instinct with life." An illustrative graphic chart from this series of experiments was highly instructive, and is intelligible to lay readers. This particular experiment was directed to test the recuperative power of a diet of bread and skimmed milk on young rats fed on an abnormal diet (rice, porridge and horse flesh) for six weeks after weaning, and then changed over to the bread and skimmed milk. *The instantaneous and dramatic changes that followed* are indicated on the chart, in which the top figures represent the days since weaning, the figures on the left being the weight in grammes. The explanation then given of the remarkable changes revealed was that there had been a "loss of some vital function or functions, and more especially of those concerned with warding off bacterial infection from the respiratory and probably also the alimentary tract." Some years later this subject was brilliantly illuminated by the discovery of "vitamins" by Hopkins and others. Immensely valuable as "vitamins" are in the treatment of sick men and sick animals, a lengthy medical experience has convinced me of the pre-eminent importance of *securing these vitamins as far as possible from fresh foods grown in a healthy soil.*

Great caution is necessary in accepting too readily the conclusions arrived at from highly skilled laboratory research work as being applicable to the established practical conditions which called for the research. This is emphasised by the following experience. Many years ago the curative influence of sunshine on rickets was fully established, as was also the special value of milk which had been irradiated by the "ultra-violet rays," Vitamin D being essentially, the responsible factor in the cure. Curiosity then prompted the examination of a sample of irradiated milk by highly skilled laboratory test to determine the presence and relative amount of Vitamin D. The official report revealed the

presence of Vitamin D, but *"in very small amount compared with that present in certain medicinal preparations of Vitamin D."* Neither the skilled finding of the laboratory test nor the *bona fides* of production of the remedy were for a moment questioned. What did appear to me, however, to be open to question was the too great readiness to apply conclusions from laboratory findings alone or too largely, in the absence of the experience and opinion of the skilled practical men in the industry who had an intimate knowledge of the practical side of the problem which formed the basis of the research. To illustrate — I had just then seen a few cases of advanced rickets which had been treated for some months under careful hospital conditions, the treatment including the medicinal vitamins referred to in the Report, in which, when the milk which had been used for some months in the diet without any apparent benefit, was replaced by an equal amount of milk which had been appropriately irradiated with ultra-violet rays, a very remarkable recovery indeed took place in a few weeks, all the other conditions of treatment having been maintained throughout. Taking the long view, I am satisfied that *"science" as sometimes now applied may become a grave national danger.*

THE MIDDLE WAY, AND THE IMPORTANCE OF RESEARCH.

If the national policy is framed too exclusively on the "protective foods theory," it could hardly fail to react unfavourably on the nutrition of the soil as a whole, through the loss of the organic "living" foods in the "muck" from the sheep and cattle, on which the nutrition of the healthy soil so much depends. Nature is indivisible, and the new principle referred to above should receive very careful consideration indeed. From the point of view of national policy, the sound line of approach is, in my view, correctly indicated in the pamphlet dealing with "Looking Ahead: Agricultural Reconstruction" (Conservative Party Sub-Committee), as follows: —

"Sources and availabilities of protective foods are in transition. Inherent agricultural circumstances are controllable, or capable of being met, to so small a degree that by comparison they must be regarded as unchangeable. Agricultural policy must allow for transient circumstances, but cannot be founded on them."

In conclusion I respectfully submit a plea for research, made with an open mind, directed to test the value of Sir Albert Howard's work and teaching. Do we not still live too largely in a world of tradition and lack of flexibility? What does seem lacking to-day is a wise appreciation of the significance of science in relation to human and industrial progress. The truly scientific spirit which is the essence of progress is sufficiently prevalent in the industry to allow for a greater number of highly skilled practical farmers exercising a larger influence in the higher Councils of Research.

I believe it is possible, and indeed probable, that if the State would use a part of the farms and laboratories under its own control and management, appropriately co-operating with other control centres as could be arranged for such an investigation, the results achieved, even before the first five years' experimental period was concluded, *would far exceed in value those likely to be achieved in the next thirty years under the existing system of Research administration.*

FENTON BARNS,
Drem, N.B.,
24th September, 1943.

Earthworm-fed Chickens

Account of experiment.

THIS past summer we conducted an interesting experiment. We took a group of ten Rhode Island Red pullets about 3 months old and divided them into two groups of 5 each. Group A were weighed at the start and were found to aggregate a total weight of 10½ lbs. They were fed the usual kind of diet consisting of grains, etc. Group B which were found to weigh 11 lbs. at the beginning was fed less grains, but were given a daily

ration of earthworms also.

The experiment lasted about six weeks and the results were amazing. Group B, the earthworm-fed group put on much more weight and their feathers took on a much richer, deeper hue. You could see that they were more full of action and healthier looking than group A. Here are the figures on weight.

Weight at Beginning	End	% Increase
A 10½	14½	38%
B 11	17	54%

I wrote to the Pennsylvania State College of Agriculture explaining our findings and asking whether they would be interested in making vitamin tests on both groups, we received the following interesting reply:

November 5, 1943.

Dear Mr. Rodale:

This is in reply to your letter of November first addressed to the Department of Poultry Husbandry.

To determine the vitamin content of poultry meat or any other food is not a simple procedure. For example, vitamin A assay requires about one day while vitamin D assay cannot be completed in less than four weeks. Determination of other vitamins requires periods of time that falls in between these two extremes. Thus, you see, it would take months of work, thousands of dollars, and a large amount of poultry to find out the nutritive value of poultry meat. In addition, there is no laboratory in existence that has either the technical staff or specialized equipment to carry out assays of all the vitamins.

Very truly yours,
Robert V. Boucher,
Professor of Agricultural and Biological Chemistry.

I replied under date of November 8, as follows:

Dear Professor Boucher:

Thank you very much for your letter of November 5th in connection with the possible examination of different chicken meat for vitamins. Would it be possible to make some other kind of a test, perhaps merely a mineral test to show the superiority of one kind of meat over another.

Very truly yours,
J. I. Rodale, Editor
Organic Gardening.

A reply was received under date of November 11 as follows:

Dear Mr. Rodale:

This is in reply to your letter of November eighth. Scientists are generally agreed that the diet of the animal influences, within limits, the composition of the meat. All known changes of this kind, however, are comparatively small in magnitude. The best known example is the influence of the dietary intake upon the thiamine content of pork.

To answer your specific question regarding minerals, poultry meat is not a good source of minerals. Even if poultry was consumed to the exclusion of all other meat, it would not contribute an outstanding part of the mineral requirement of the individual. From the standpoint of the poultry producer, it would be very difficult for him to make out a case to promote the sale of poultry meat on the basis of its value as a source of minerals. Before it could compete with vegetables as a class, for example, means would have to be found to increase its mineral content something like 1000%.

Very truly yours,
Robert V. Boucher
Professor of Agricultural and Biological Chemistry.

I wrote to Professor Glen Wakeham, professor of chemistry at the University of Colorado, who replied under date of November 20, 1943 as follows:

Dear Mr. Rodale:

The results you report from your experiment are about what any nutritionist or biochemist would expect. It is well known that most whole animals contain at least small amounts of all the known vitamins. It is also known that many grain mixtures for chicken-feed are deficient in one or more vitamins, and also in certain minerals. Meat also has a "specific, dynamic, metabolic action" for many animals, and it could be taken for granted that chickens fed on grains plus worms would do better than chickens fed on grains alone. It has often been observed that grain-fed chickens, during dry weather, when no worms nor insects are available, peck each other bloody in their urge for meat.

I am not sure just what you wanted in the way of vitamin tests. Some vitamins can be assayed by chemical methods: others—as yet—only by biological assay, i.e., feeding two groups of standard Wistar rats, one on a diet known to be free from the vitamin in question and the other the same diet plus the material to be tested. To chase down all the known vitamins in such an experiment as you seem to propose would require hundreds of chickens and thousands of standard rats. There would be no point in working up a sin-

gle chicken and testing, chemically, for the presence of the vitamins which can be chemically assayed. They would all be present, or else the chicken would have died from avitamosis. If you know the composition of your grain-ration, you could find from any standard work on nutrition what vitamins and minerals are likely to be missing, or deficient. Then your experiment would indicate that earthworms contain the missing substances—which in any case could be taken for granted. Your experiment is of practical value in demonstrating that, for chickens, at least, a diet of grains plus earthworms is likely to produce healthier chickens than a grain-diet alone.

There are many good points in "Organic Gardening," and I am reading it with interest.

Yours faithfully,
G. Wakeham

We expect to have more to report on chicken and earthworm experiments during the summer of 1944.

Cottage Hygiene

BY DUGALD SEMPLE

From The Vegetarian Messenger (England)

LIVING in the country has taught me many things, especially when brought into direct contact with Nature in the cultivation of the soil. To grow one's own foodstuffs successfully requires not only practical knowledge, plenty of work and patient endeavour, but a just appreciation of all the facts concerned with healthy living.

One of my problems has been to provide manure for the soil, especially now that horse manure is very scarce owing to the more general use of the motor tractor. At first I was rather loth to use night-soil because of the general prejudice against it and my ignorance of the relative values of all manures. But this was some thirty years ago, and since then I have learned much about cottage hygiene and what our latest authorities such as Sir Albert Howard, G. T. Wrench, M.D., H. Reinheimer and others call "the rule of return."

A book which influenced me much was "Rural Hygiene" by Dr. Vivian Poore, and caused me to resort to the ancient Chinese practice of returning to the soil that which comes from it. But this must not be confused with our old-fashioned evil-smelling privy system—the product of towns and cities which led to no end of disease. The fact is, we cannot apply the principles of right sanitation where people live in congested areas, and I agree that the water-borne system of sewage disposal is almost essential in our tenement and built-up areas.

System of Waste.

But all this boosted so-called scientific method of sewage disposal is a shameful waste of valuable manurial elements. Every year we pour thousands of tons of phosphates and other valuable minerals into the sea, and our already impoverished land, suffers as a result of our failure to return to it those elements which successive crops have extracted. The truth is, we are a scientifically stupid nation. No wonder Sir Albert Howard had to recant much that he had learned in his agricultural studies when he began to practise the Indore system of cultivating the soil which he learned from the peasants of India. Sir Robert McCarrison had a similar tale to tell after studying the habits of that vigorous healthy race—the Hunzas of Northern India.

In addition to this system of waste, we have almost ruined our soil by the use of artificial manures, causing no end of plant diseases, and costly spraying with poisonous insecticides. The soil in this country, is becoming increasingly poor and will continue so until we can read the writing on the wall.

As to our wonderful drainage system, this has not only polluted many of our lovely spring wells, but is a constant danger to houses as a result of sewer gases and leaking pipes. Here is what Dr. Poore says: "Since the introduction of the water closet, we have had four severe epidemics of cholera, a disease not previously known, and enteric or typhoid fever—previously almost or quite unrecognized has risen to the place of first importance among fevers in this country."

The Living Earth

Now the proper method of disposing of all animal waste or human excrement is to bury it in a compost heap along with all vegetable waste from the kitchen or garden such as slops, cabbage leaves, pea pods, weeds, grass-cuttings, etc. Contrary to popular belief, it is a gross mistake to bury organic refuse deep down in the earth, as this leads to rotting instead of the proper process of oxidation and the formation of valuable nitrates. It is the upper layers of the living earth which are most abundant in micro-organisms which hasten the disintegration and aeration of the soil. Most gardeners, indeed, know this fact, and are careful when trenching not to bury the top spit too deep down in the earth.

As a practical solution, I would have earth closets installed in every rural cottage, the dry earth being stored in a box beside the seat and thrown into the pail always after use. The contents should be buried daily in the compost heap, which should be turned over occasionally and allowed to mature until there is a wealth of brown humus for nourishing the garden. There is nothing nauseous about this practice, and we have the satisfaction of knowing that we have enriched the garden with the most nourishing plant food known to science.

Green Manuring

Why Compost is Better

Compost Club Magazine (New Zealand)

"BETWEEN 1910 and 1926 I was farming in Australia, California and the State of Washington, U.S.A.," writes "Erewhon," Peel Forest, in a letter to the Editor. It was standard practice there to grow a leguminous cover-crop between the rows of fruit trees during the fall and winter, drilling superphosphate in with the seed, then, after discing, to turn the lot under with the plough.

This procedure seemed sufficient to keep the soil in good shape, except in very heavy bearing orange groves, where lucerne chaff and blood and bone were sometimes used as well, and turned under with the cover crop.

Cover Crops "Less Work."

It appears to me that the only advantage of composting over cover-crops would be that your material disintegrates quicker, whereas the use of cover-crops would be less work and disintegration would proceed more slowly, and the nitrates thus released would not be so liable to be leached away by heavy rains and over-irrigation.

Cover cropping more resembles Nature's way as observed in forest and wild grass lands, where the leaves fall to the ground and rot slowly. It also resembles the Chinese method of treading green cut lucerne into the mud formed by irrigating between raised beds of vegetables, etc.

Now, what I want to know is: Would the orchardist be any further ahead if he were to compost his cover crop and then turn it into the soil?

Is there any advantage whatever in composting except in speed of decomposition over Nature's more leisurely way in the cover-crop method.

(Dear Erewhon.—Green manuring is a complex subject, and a brief statement upon it suffers from over-simplification. One of its principle disadvantages is that in digesting the green matter the soil has to use up agencies, i.e., bacteria, that could be more usefully employed in feeding a crop. Until the plants turned in are pretty well rotted down they feed upon the soil instead of feeding it. If a crop is grown upon green-manured soil before this breaking down is complete the growing plants are rendered more liable to diseases and pests. Among the advantages of compost over green manure are (1) Compost can be made with a wide variety of ingredients and hence supplies more of the varied elements necessary for soil health and plant growth; (2) The fungus activity necessary in the digestion of masses of crude material takes place above ground, as in nature. In nature leaves and other debris are rotted down on *top* of the soil and *not* within it. *Composting is thus closer to Nature than green manuring.* The Chinese, by the way, are about the oldest and most faithful composters in the world. When one can

wait for the rotting down process to be completed and for the soil to recover from the effort of digestion, green manuring may sometimes have its uses, particularly in large-scale field operations. At the same time we think that where compost heaps cannot be made, sheet composting, i.e., spreading of compost materials—both animal and vegetable—on the surface of the soil and allowing them to break down there is a better, surer and healthier way of supplying humus. And in the case of fruit trees, which are now particularly liable to fungus infections, composting is much to be preferred to green manuring. Dr. Steiner, who gave detailed advice as to the treatment of deciduous fruit trees, laid it down that they should receive only the most refined compost.

It seems that if you overstimulate the fungus life of the soil by burying masses of crude green stuff or fresh manure, the normally beneficient fungi take on a different form and rise out of the soil and feed on the living plant in the form of disease. In co-operating with Nature the longest way round is usually the shortest way home.

"Quick Return Compost"

"The Divinity within the Flower is sufficient in Itself."

BY MAYE E. BRUCE

Originator of The Quick Return Method

MAN is slowly but surely realising the truth: that the Soil is alive. Life flows through and from it, it gives royally. Man has taken much, and given very little in return; now he realises that to keep life, plant life, *within* the soil, he must give life, plant life, humus, *to* the soil. Unhampered Nature replenishes this soil life by the endless cycle of life and death, decay and transition, illustrated by the Forests with their deep layers of leaf mould; illustrated too by the plains where the matted dying grass turns to humus, and where the vast herds of buffalo and wild horses wandered for thousands of years, extracted from the grass the food they needed, and gave the residue back to the soil, where it lay, a rich treasure till man took command, used up the accumulated capital, took all, and gave—no life, but manure from a bag, and the soil died—bankrupt.

Today, the soil needs life more than ever. Farmyard manure is hard to get, and costly, and we are turning to "compost", to the making of living "humus" by the efforts of man, co-operating with, and learning from, Nature.

There are many systems, all successful, but the need is so urgent, the world so wide, individual circumstances so varied, that no apology is required for introducing yet another method of turning vegetable waste into fertile soil.

This system is known as "Quick Return Compost" or "Q. R. Compost" for short. It was started eight years ago, tested and proved on a hungry thin soil, high up on the Cotswolds. It is used, and enthusiastically used, by gardeners, smallholders and farmers, in every part of England, and good reports come in from experts working on every variety of soil.

It is quick in action, both in ripening the compost, and in producing results on the land.

It is labour saving, in that the heaps require no turning. It is within the reach of all, as the herbal solution used as an accelerator can easily be made at home.

The method is based on the conviction that Life is universal, but that it manifests in a different rhythm in each of the four Kingdoms, as expressed by the old Eastern saying in the words:— "Divinity *sleeps* in the Stones, *stirs* in the Plants, *wakes* in the Animals, Is conscious alone in Man."

We believe that for the successful feeding of plant life, we should keep within the "rhythm of life" of the plant kingdom. All experts agree that the most valuable factor in the soil is humus. What *is* a soil "rich in humus"? It is a soil full of decayed vegetable matter; in its finest form soil made of disintegrated plants, in other words soil packed with the vitality of plant life. The best natural form of humus, is Cow manure! This sounds like a contradiction, *but* — cow manure is nothing but *plants composted by the cow.* By heat,

the heat of her body, by pressure, the pressure of her internal organs, and by the action of digestive juices, she extracts from the plants the vitality she needs for herself, and gives the residue back to the soil in the form of manure. But if this manure is used, while the animal forces are fresh and vital, it will burn plants, and introduce disease and pests into the soil.

After two years, when it is thoroughly ripened, it turns to a black friable soil—pure humus.

In making Q. R. Compost we follow the lessons taught by the cow. We make full use of the natural heat of decomposition, retaining this heat by a simple means of protection.

The Bin

We make a bin, a box without a bottom, the height from 2½ ft. to 3½ ft., the size from 2 ft. square to 6 ft. square, according to the size of the garden. We aim at filling the bin within six weeks. Two small bins are better than one double the size. *Foundation.* We build directly on the earth, unless the soil is clay, when a six inch layer of rubble is needed for drainage. *Charcoal.* We sprinkle a few handfuls of charcoal on the foundation. Charcoal absorbs poisons, and keeps the heap sweet. Make it by building a fire of wood, and when it is red hot, douse it with water.

The Heap

We use any green vegetable refuse, as fresh as possible, weeds, spent plants, cut grass, clearings of beds, nettles, anything and everything, except woody material too tough to cut with a spade.

We build in layers, approximately 4 inches thick, alternating the tougher material with juicy weeds or grass clippings. If we have no such variety, we separate the layers with two inches of soil or any sort of manure.

We tread down the heap at intervals, gently, just to keep the surface flat, and eliminate air-pockets.

We give two dustings of lime, at approximately 12 and 24 inches, using quick lime in preference to garden lime, though either will answer the purpose. We build until the bin is full, and firm.

Protection

We always keep some sacking or other material on the top layer. This is very important. It keeps the damp heat from escaping, and prevents sun and wind from chilling and drying the heap. We protect the heap from rain with a sheet of corrugated zinc, slanted so that water will run off, and air can circulate below it. Aeration is important. Rubber is never used, as it insulates the heap. The golden rule is:— "Keep the heat *in*, and the rain *out*." The heat rises to 160 degrees and 200 degrees Fahrenheit, and it is this temperature which kills weed seeds and disease; but it does something more.

The plant refuse is fresh, and full of life; the heat quickly destroys the material part, the stem, leaf, flower, and liberates the vitality of the plant—Vitality—Life—which must go on, because it is Eternal. It cannot escape, because of the protection round the sides and top of the heap, so, like the natural forces of water, and electricity, it takes the line of least resistance, and turns back into the heap itself, radiating through it, vitalising it, filling it with energy, till with the vast co-operation of bacteria, fungi, earthworms, and countless other soil workers, the living green stuff is turned into sweet, friable soil, filled with the freed vitality of plant life.

The transition is swift, but it can be hastened, and the heap enriched, by the use of an "accelerator"— a herbal solution made of Yarrow, Nettle, and Honey. There are certain elements essential to plant life. Yarrow and Nettle hold these elements *in plant form.*

Yarrow contains Lime, Iron, Potash, Soda, Phosphorus, Sulphur and Nitrates.

Nettle contributes Carbonic acid, Ammonia, Formic Acid, and Iron. (The solution can be made at home, the formulae is given at the end of the article.)

The treatment is simple.

We make holes with a crowbar, about 18 inches apart, and to within 6 inches of the bottom of the heap, pour 3 oz. of the fluid into each hole, and fill them with dry soil, ramming it down to prevent air-pockets.

The living energy of these elements radiates through the heap, adds to its richness, and accelerates the speed of its decomposition.

A spring heap is ready in from 4 to 6 weeks.

A late summer heap in from 6 to 8 weeks.

An autumn heap in from 2 to 4 months.

The soil will be dark, friable, and will smell very sweet. That is the sign that it is ready; even if it is not entirely soil, it can be used, the air will complete the process.

We use it like manure, but keep it in the top four inches of the soil, unless we are trenching for Peas, Beans, or Celery, when it is placed at the

bottom of the trench.

Results. It gives substance to thin hungry soil, breaks up clay soil, brings new life to dead soil.

Plants. All plants thrive on it, and grow "to their own perfection." Colours are deeper, scents stronger, taste finer and sweeter. Productivity is increased, health improves, and plants are increasingly weather and disease resistant.

Manure Economy

While Farmyard Manure is almost unprocurable in quantity, it is often possible to collect a little fresh manure from fields or roads. Here is the best way of making the most of it.

Sink a tub, or box, in the soil, to within 6 inches of its rim. Fill it with solid manure, cow if possible, if not, horse, sheep, rabbit or poultry. Treat it with 3 oz. of the solution. Cover it with a lid to exclude rain. Use it any time after three weeks. A trowelful to a gallon of water, further diluted to straw colour, makes a good liquid food for plants, and is especially good for fruit trees.

Method. Run a fork into the soil at 3 ft. intervals, round the outside stretch of the branches. Pour a gallon of the liquid into each set of tiny holes. This is done in early spring. Compost water can be made, and used in the same way, and at the same strength.

Farm Heaps

It is obvious that bins cannot be used on the farm, but with a quantity of material, it is possible to make first rate heaps in the open, in the form of a long clamp, made of a series of sections, each section approximately 8' x 8' x 6'. Farm heaps sink quickly, it is wise to build in pairs, and add to the first section as it shrinks. This can be done, as long as there is heat in it. When it is firm, cover it with 4 inches of soil.

Straw

Straw and chaff will break down and make first class black humus in six months. The technique of building and treatment is slightly different.

Build in layers 6" straw, 2" green stuff, 1" soil or manure. Repeat till the heap is finished. The *vital* thing is that the straw layers must be well moistened, and sprayed or watered with treated liquid manure or liquid compost. The heaps must be well built, trodden down firmly. No turning is necessary. The outside four inches act as a protection; this will not decompose, but can be used as a foundation for the next heaps.

A tank of farmyard liquid manure can also be treated with the solution. Soak some sand in the liquid accelerator (same strength as used for a heap) scatter the wet sand over the tank. The sand will sink, and free the solution to do its work.

Formulae for Solutions

There are many alternatives as to the plants used in the Formulae. I believe that every country possesses its own plants, for its own needs, if only herbal scientists would analyse them, and find them out. The basis is that any combination or number of plants can be used, provided they contain between them, the elements most essential to plant life.

The simplest formulae is given here:—

Yarrow (Achillea Millefolium) contains Lime, Iron, Soda, Potash, Phosphorus, Sulphur and Nitrates.

Stinging Nettle (Urtica Dioica) contributes Carbonic Acid, Formic Acid, Ammonia, and Iron.

Details

Gather the flowers before mid-day. Use the flowers and young leaves of the Nettle, and the flowers only of the Yarrow. Keep the herbs seperate. Moisten them with rain water; pound them into the consistency of a wet poultice. Wrap in muslin and press out the juice. Filter it and refilter it till it is absolutely clear of residue. 1 oz. of each essence will be ample. Keep in dark bottles in a cool cupboard.

For Stock Solution A.
Nattle 1 drop.)
Yarrow 1 drop) Water 1 oz.

For Stock Solution B.
Honey 1 drop. Water 1 oz.

For Use
A. 1 dram.)
B. 1 dram.) Water 1 pint.

(1 pint will treat a heap 6 ft. square).

The essences must be made fresh every year. The reason is interesting. The constituents in plants vary in relation to each other each year, according to varying seasons. One year, say, Lime will predominate, next year it might be Iron, or Soda. It looks as if Nature, knowing what element the soil will lack in the following year, gives an extra provision of it to each individual plant. We try to follow her leading, and, by using the current year's growth for the essences, charge the compost with the element it will need. The treatment follows homeopathic lines "The

Power of the Infinitely Little". The strength of the final solution is approximately 1 in 10,000. It is therefore of no special value to put in layers of Yarrow and Nettle (Layers of wetted bruised Nettles will increase the heat of a heap) and expect them to transform the heaps. The power is there, but so strong that it passes through the heap, and is lost in the air above..

This article is a summary of what has been learnt by practice, and tested for years. It is written in the sincere hope that it may help those who are striving against odds, to better the soil committed to their charge.

MAYE E. BRUCE,
Hillhouse, Sapperton,
Cirencester, England.

Further details and alternative formulae are to be found in a book "From Vegetable Waste to Fertile Soil" published by Faber and Faber, 24, Russell Square, London, price 2/6d.

Practical Plant Protection

BY ROGER W. SMITH

JUST as soon as you start growing your own vegetables you run into the matter of plant protection in some of its many forms. If you are observant you will get the idea quickly. You remember that in the autumn the multitude of seedlings that spring up under trees and in wild places were covered by drifting leaves and later by deep snow. You remember that once, during a mild winter day, you poked aside this deep layer of snow and leaves just to see what had happened to the little seedlings. They were still there, many of them so green and bright that their freshness surprised and delighted you. Thus you were introduced to winter protection.

As much as the good gardener is able, he strives to imitate nature in this matter of plant protection. Sometimes the material used is scant and crude, as when nothing more than snow is heaped upon a small planting; sometimes the protection given is very elaborate, as when a fig tree in the latitude of Philadelphia is tied and bundled and put to bed for the winter.

Generally, however, winter protection is slight and aimed first, at maintaining an even though not necessarily high temperature around the protected plant; secondly, at preventing the heaving of the soil through alternating periods of warmth and cold and thirdly, in the case of certain trees and bushes, at preventing the drying out of the plant at a time when the roots are unable to replace the moisture because of the hard-frozen condition of the ground. All this might seem very complicated. It really isn't. As you will find, it is patterned after what happens naturally.

Winter protection is not usually placed until after the ground becomes quite cold. Its intention is to create only a very slight change in conditions although a very steadying one. Often it consists of no more than the placing of a layer of straw or similar material over the plants and twiggy branches or scattered topsoil to hold this material in place.

But the skillful use of winter protection can accomplish surprising results. For example, suppose a planting of strawberries receives its usual mulching of straw or hay. The snow comes, a foot or two of it. Then one half of the planting is given another heavy covering of straw on the top of the snow. What will happen?

Under the straw the snow will melt slower and later, the ground will take much longer to warm up, so that that half of the planting which received the additional protection will come into bearing much later than the other half, resulting in a later-succession-crop.

Winter protection is frequently crude and slight but it will pay you garden dividends to understand its functions thoroughly, and above all to appreciate the tremendous difference only a very slight change can make in plant growth. But this matter of plant protection does not end with winter coverings, the experienced gardener carries it out in many variations. What is known as the cold frame follows as the next logical step. Its purpose is slightly different from that of winter protection.

Because many garden vegetables require a relatively long season to reach maturity, are

tender to frost, and the number of frost-free days in your garden is limited, these plants must be started into growth long before all danger of frost has passed. Gardeners overcome this difficulty by using various protective devices, chief among which is the cold frame.

In this connection, you may have noticed that the small, wild plants growing on the south side of a wall in a sheltered, sunny spot, came up much earlier in the spring than those plants on the cold, exposed side of the wall. The cold frame aims at reproducing this favorable state, at making life slightly more congenial for the plants growing within it. Here again, you will note that conditions are only very slightly altered.

A cold frame consists of a large, bottomless box with a hinged, sloping glass lid. It is generally placed in some site where its sloping glass top will receive a maximum amount of sunlight. The sides of the cold frame should be well sunk into the surrounding soil. The young plants growing within it may be set directly into the soil it covers or they may be planted in flats placed in the cold frame. These flats should contain specially prepared soil, a matter of great consideration. This soil should be suitable for easy plant growth. Whatever admixture of sharp sand may be required in certain cases, the foundation of the mixture should consist of sifted compost humus. No improvement in the environment of a plant can act as a substitute for natural plant nutrients and a foundation of compost enriched humus.

During warm days the glass lid—standard cold frames carry one or more glazed sashes six feet by three feet—should be propped up for ventilation or taken off altogether. On very cold nights the frames should be protected by a covering of mats or even a heaping of dry hay if nothing else is available. Some cold frames are equipped with covers of canvas which may be rolled back when not in use. Care should be taken to prevent overheating. Plants generally raised in cold frames are a sturdy lot, they resent excess heat and lack of ventilation.

Yet even with the use of a cold frame, you will sometimes find that your plants do not get started early enough to mature at the date you require them. To overcome this difficulty the hot bed was designed—another step in plant protection.

A hot bed is essentially a protected seed bed, artificially heated. It is built along the lines of a cold frame. In its warmed interior seedlings may be grown during very cold weather to be transplanted later to the cold frame where they will be hardened and when well developed be moved to the garden as early as possible.

Heat for the hot bed is often provided either by fermenting horse manure or by electricity. Since you may have difficulty securing large quantities of raw manure, the first method may not be practical. The second method has its limitations since the special electrical heating units are not easily secured. A fairly good job of heating can be done by installing light bulbs in a cold frame and testing the results. But for home garden purposes a very good scheme is to install a cold frame over a basement window.

With the frame firmly in place and banked with topsoil around its sides, it may be very readily warmed by opening the basement window from the inside and allowing the heat from the basement to warm it. Then, if the basement warmth is insufficient, a couple of light bulbs may be installed for use when their heat becomes necessary.

Using flats, such a frame may be operated either through the basement window during stormy weather or from the outside during fair weather. However, in using such a hot bed you will soon discover that it is necessary to place it where it will receive a maximum of sunshine. Without plenty of light the added heat will tend only to make the plants weak and spindly. Like the cold frame, the hot bed requires some skill in the regulation of light and ventilation to which is added care over heat and moisture.

In the garden itself many forms of plant protection are most useful. They are used to protect the plants against heat, cold, drought, insects, and many other things. Early in the spring young plants sometimes have to be protected against strong, cold winds. Sometimes this can be done by sticking shingles or boards in the ground on the exposed side of the plant to act as small windbreaks, as with early cabbage; or it may be necessary to cover the entire plant, as with early cucumber and squash plants.

Small waxed paper tents have been much in favor lately. These small tents are placed over the plants and held secure by a scattering of soil around their lower edges. Later, after the tents have protected the plants against late frosts they are sometimes replaced by

larger ones made of cheesecloth which protect the plants against insect pests.

More elaborate than these tents are the so-called plant forcers. In the use of these and the many other forms of plant protection, your own ingenuity will have to be your guide. In general, plant forcers are small cold frames placed over individual plants. Sometimes the forcer consists simply of a bottomless wooden box with a glass top. More often the box is cut away at one side and slotted to hold a pane of glass which is inserted at an angle. The box is then placed over the plant with the pane of glass facing the southern sky.

But whatever form of plant protection you use, from rough winter mulch to hot bed, from paper tent to cold frame, you will learn by experience that ventilation is necessary. With winter mulches ventilation to some extent is obtained by the avoidance of material likely to pack, such as leaves, without first applying straw. With the paper tents and smaller forms of protectors ventilation is best obtained by the use of small aperatures made on the south side of the structure.

Sometimes your needs will be amply met in some very simple manner, as when a basket is inverted over a newly planted tomato to protect it against excessively hot sunshine. But in no other phase of gardening work does your own skill at making the most of what you have count for so much. For example, a cold frame is usually thought of as a structure having a rather definite and set place in the garden. Yet many good gardeners make a practice of moving the cold frame around the garden. Today, the cold frame may be placed over a small planting of early lettuce; later, it may be moved away and used to urge and defend some entirely different crop.

Practical plant protection takes on a multitude of complex forms, from the vast slathouses and the great glass roofs of the nurseries, to the plain manila bags tied over the bunches of bagged grapes to guard them against wasps and birds, and the little paper collars that protect the stems of tomato plants against cut worms; from the scarecrow in the corn to the little ditches dug to hold back the grasshopper hordes.

But if you look keenly you will find many types of plant protection used in nature, the manner in which the leaves protect the fruit and stem against sunburn, the fallen leaves which mulch the roots, the wide spread lower leaves of the smaller plants which shade the soil around its roots and protect it from too rapid drying out.

Even in the matter of the soil itself you will find this protection of the plants in the manner in which the humus, first built up by natural mulches and gradually disintegrated and made available for the plants' use, also acts as a reservoir to maintain a generous amount of moisture for the use of the plants. You will discover that the acme of plant protection is reached by the organic humus in which the plants grow, which supports and feeds the roots and which is so faithfully supplied for use in your garden by the well made compost heap, for without this intricate and natural protection of their roots most plants would indeed quickly perish.

Artificials Produced a Soil Slump

Organics Won The Battle

BY CAPTAIN E. V. SANDERSON
President N.Z. Forest and Bird Protection Society.

From The Compost Club Magazine (New Zealand)

THE New Zealand Humic Compost Club is without doubt doing very valuable work if only by its advocacy of humus. Progress of civilisation is not achieved in a mass advance way but is brought about by advance in a queer sort of fashion—that is by one or two people of advanced thought pushing and scrummaging their way at the head of a line of supporters. The leaders especially and the supporters in a lesser degree are usually looked upon as people with a kink by some with interests opposed to advance. Perhaps the relating of

my experiences on sand dunes may help me to rank as a supporter.

First of all let me say that I do not pretend to a full knowledge of the soil, and do not feel a bit lonely in saying so, because I have never come across anybody who has such a knowledge. My remarks are merely an attempt to relate my experiences as they appear to me.

The area experimented upon was pure sand fifty years ago. Spinifex was about the only vegetation attempting to hold the roving sand hills—later yellow lupin came in and stabilised the situation.

It was at that stage when odd flax and toitoi were coming in that my operations commenced. This process of ever changing vegetation would of course, go on if not interfered with by fire or animals, and in perhaps 100 years certain native trees would establish themselves and a native forest would arise. This process is of course engendered by the falling leaves of plant life and the decaying boles, limbs and roots of any plants that die.

My experiment on less than half the area was to ascertain if Nature could be led by the forelock, as it were, and her process advanced about 100 years, and at the same time find out if the leaf debris and such like would be sufficient to maintain the trees at maturity. Coastal inhabiting trees were chosen and those which usually flourish immediately behind the initial coastal fringe such as karaka, ngaiu, etc. Puriri was even ventured with, as the area suffered very little from frost.

Nearly all the seedlings were immediately stripped of their leaves and converted into bare stems by wood lice. A permit was then applied for to keep three wekas, as I knew that any insect that could dodge their eye, aided by their ability to turn over debris with their beaks, needed a lot of wits. At the same time the whole area was securely netted. Within a fortnight of the liberation of the wekas, the young plants developed new foliage and continued to prosper amazingly, while the wekas put on condition rapidly.

The whole experiment of planting native trees on sand dunes was looked upon as a joke among the neighbours, but even then the value of decaying vegetation was realised, and many tons of cup lupin and other vegetation were allowed to decay on the site. Heavy winds swept the area and even blew growing lupin down en masse, but still my little plants survived, each marked with a korari stick. When three years old the youngsters began to cover the ground and to overcome the grass and lupin which had been a bi-annual grubbing job. They could defy the gales too, as each was able to lean on its neighbour, as it were.

Now came my manurial experiments in an effort to expedite growth. Super was quickly abandoned owing to pronounced deleterious effects on the sand. At times the leaves of many plants would incline to yellowing, indicating deficiencies. Slag and sulphate of potash were then applied with apparently beneficial results, as I found that the richness of the green in such leaves as karaka could be brought back with artificial fertilisers at will.

In about three years following a dressing the invariable soil slump came as indicated by the return of the yellowing of the leaves. Again slag or potash was applied with exactly similar results. I consulted artificial fertiliser experts, who assured me that my experience was only that which usually occurred! This appeared to me unnatural and no more artificials were used. Blood and bone was relied upon solely, and to-day trees twenty and thirty feet high prosper year after year and do not now show the inclination to yellow in the colour of their leaf green. The battle is won and Nature has been advanced many years, thanks to the resolution to never tidy up and to rely on natural animal wastes.

New Zealand itself has no indigenous mammals, therefore animal wastes must have been supplied by the droppings of birds and insects and from their dead bodies, and to judge by the appearance of my semi-whitened asphalt paths the droppings of birds can provide ample animal waste. Indeed the fact that the soil in New Zealand was formed with the aid of such animal waste may account for its many peculiarities when compared with the soils of other lands.

The Pueblo of Taos

A Self-Sufficient Community.

BY ROBERT LAWRENCE McKIBBIN

From the Farmer's Weekly (South Africa)—Sept. 9th, 1942.

A Strikingly successful example of such an enclave is to be found in the "pueblo" ("Pueblo" is a Spanish word meaning village) of Taos, in the semi-desert country of New Mexico, U.S.A., which is vividly described in a recent "survey of rural poverty in America", entitled *"Corn Bread and Creek Water"*, by Charles Marrow Wilson. It is most significant that this very wide survey of rural poverty in one of the world's greatest agricultural countries shows the pueblo of Taos to contrast very favourably indeed with general conditions among American farmers during the past couple of decades. Here is a brief description adapted from the above-mentioned work:—

"In the pueblos of the Rio del Norte live the longest-settled of contemporary farmers, a people of peace and of good earth, who have tilled fields and raised crops since before the dawn of written history. The Taos pueblo is farthest to the north, with rows of small fields, well tended and carefully irrigated. Every Taos family grows and prepares its own food and feed: vegetables, fruits, berries and grains. Almost every member (about 800 people) has the use of a milk cow. They own collectively about 250 head of milk cattle. Children drink milk, and most of the rest is made into cheese. The Taos plan and grow crops with a first idea of family self-sufficiency. When this has been provided, the individual farmer is at liberty to sell any surplus. Within the pueblo nearly all trading is in barter and little money is needed.

Communal Land

"The Taos reservation, about six miles square, is owned communally. It is wholly self-supporting without direct subsidy from the Federal Government. Its water reservoirs lie at the base of a high mountain, and are fed by springs and by a system of seepage ditches. Well-tended ditches, equipped with wooded lock-gates, take the water to the cultivated fields and to about two thousand acres of grain and alfalfa (lucerne).

"In the lowlands, near the pueblo, are the garden farms—fenced patches of from two to six acres. These plots are allotted to each family by the Taos council. The soil is rich and water is rightly treated as precious stuff. As a rule each garden has a small plot of corn (maize) or wheat for family use, also a vegetable plot. Cane sorghum is grown for both molasses and stock feed. Alfalfa is the favourite hay crop; melons, sweet potatoes and small vegetables are among other garden favourites. Some of the garden farms have family-sized orchards of peaches, apricots or plums.

"These gardens cover some 600 acres divided among approximately 100 families. Though the gardens are owned communally, each occupant knows that the plot is his own so long as he uses it well, and that his children who remain loyal to the community will also have land.

"The great pasture of Taos includes 15,000 acres, and is range for about 600 horses and mules and 600 cattle. The milk-herd is pastured on the best grass. The open range yields to the Taos community most of its money profits. The men supervise the range and fence-viewers make regular rounds. Range duty rotates among the men, with the war-chief as director.

"Conservation of grass and forests is no new experiment to the Taos people. It is a work

of generations and centuries. Home grass continues to nurture Taos herds, and home-raised timber provides the people with fuel, fence materials, lumber for corrals and sheds, for household furnishings and tools.

Test of Four Centuries

"The people of Taos are not pensioners of this or any other Government. Dependable records prove their self-sufficiency for at least four centuries. They are victims of extensive pillagings both by the United States and by the territory and State of New Mexico, but the Taos carry on a life that is orderly and beautiful. Being neither rich nor embarrassingly poor, the Taos people spend no exorbitant amount of time thinking about money. The council keeps a reserve of cash, but individual families live well on extremely little money. They produce at least 90 per cent. of their own food, 100 per cent. of their fuel, perhaps half of their clothing (in leather and buckskin) and nearly 100 per cent. of their recreation and social life.

"Taos government endures as a long-tested agrarian government, essentially self-sufficing. There is the governor, usually an old man; the lieutenant-governor, usually a young man; the fiscal or sheriff; the alcalde, a sort of judge or arbiter for any misunderstanding which may raise within the pueblo; the war chief; and the council. All officers are elected annually by ballot or spoken word. Most of the Taos government life is concerned with farm problems. The council sees that each man is equipped with capable gardening tools, rakes, horse ploughs, harrows, wagons and harness. There is available one good tractor, a modern grain harvester, and a grist-mill.

"The Taos pueblo is one of the most significant farm communities in all the Americas. As a farm realm it is highly self-sufficient, although the majority of the ground is poor. Its proved durability is second to none. As an agrarian institution Taos is definitely more advanced than most of rural America. Its ability to dispense with prevailing standards of cash income, its gallant defence against misguided or pernicious meddlings by the Government, its vigilance against extraneous contamination are feats truly heroic and amazing."

An Example to Emulate

Here we see what can be if men will only get together and work together on correct principles. Is there any reason why we South Africans cannot emulate this splendid example? I am convinced that we can, and that we must do so, or else we are doomed in the chaos that is bound to ensue after the war. The "status quo ante bellum," even if it were desirable, will not be possible.

Reader's Correspondence

Organic Gardening:

a—Are the brown fuzzy caterpillars with black ends, so prevalent in autumn, good or bad? I have been killing them but do not want to if beneficial.

b—If earthworms are cut with spade do they die? It is almost impossible to avoid cutting a good many.

c—Does salt solution sprayed on poison ivy and weeds hurt the soil?

d—How much should one weed a vegetable garden? It would seem a very bare garden has some disadvantages. Last summer in the drought I weeded but let the weeds lay for a mulch around the roots of eggplant, tomatoes, etc. It does not look as neat but that seems to be unimportant.

e—How fine must compost be to spread on vegetable garden? It is almost impossible for me to get much turning over done as I have not the strength and no help. If very coarse should I confine it to small fruit trees and shrubs?

f—I use my asparagus tops for mulch. When the needles fall off they make a nice cover, though thin. I find they are too slow to compost for the following spring, remaining through the winter like little wires.

Elizabeth Gest,
Telford, Pa.

Answer

Dear Miss Gest:

a—All caterpillars are bad.

b—Earthworms that are cut with a spade sometimes recover, that is, one part of them may or may not recover. The other part will die. However, there is not a total loss, as their decaying body in the soil is of help.

c—Salt solution sprayed on poison ivy might hurt the soil, but usually ivy is found near fences where the soil is not

farmed. A small amount of salt would not hurt.

d—I believe there is some advantage in not over-weeding. It is an excellent idea to use the weeds as a mulch.

e—For vegetable gardening, the compost does not absolutely have to be fine. The finer compost is for any job, the better it is, but where it is coarse, it will continue to rot in the ground. For fruit trees it should be finer than for general farming purposes.

Gentlemen:

I find that the soil in my garden has a pH of slightly over seven and I have learned that some crops require a slightly acid soil.

Can you recommend any treatment, consistent with the principals of organic gardening, that would slightly reduce the alkalinity of my soil?

I have heard that magnesium sulphate, ammonium sulphate, aluminum sulphate and tannic acid may be used for this purpose.

I would be glad to have your comments on these chemicals, particularly as to their relation to the principals of organic gardening, and also any recommendations you wish to make in regard to soil acidification.

H. R. Mills, M.D.,
Tampa, Fla.

Answer

Dear Dr. Mills:

Replying to your letter of October 20th, your solution would be to put plenty of compost into the soil. You will find this to be satisfactory for practically any kind of crop that you would want to grow. A good dressing of lime will help.

We certainly would not recommend any of the chemicals that you suggest, as some of them are notoriously bad actors in the soil. Ammonium sulphate is actually recommended by the government for killing earthworms.

Also any chemicals, which are sulphates, give rise to bacteria of a destructive kind which destroy beneficial fungi in the soil.

Sawdust and leaves are mildly acid but it is never advisable to put raw materials like this into the soil, but to compost them first.

Dear Sir:

The chemical fertilizer we have been using for our banana tree is composed of 14% each of Calcium and Magnesium Carbonate, both derived from dolomite. What would the organic formula be, in addition to compost humus and earthworms? How often and when should it be applied?

How about a listing of vegetables, berries and fruits which require a neutral, alkaline or acid soil, in some future issue of Organic Gardening magazine. Beets grow fine in adobe soil, but turnips just won't.

Have lots of slugs eating up lettuce plants, so don't understand your quotation in March issue of O. G. Page 2, bottom of last column. Have used poisoned bait, in jar cover, so as not to poison the earth. What should I have done instead?

Exactly what kind of lime should be used on compost heap, and what should the analysis read on the label? How can I tell if all the fillers used in lime are organic?

Mrs. A. Jarol,
Los Angeles, Calif.

Answer

Dear Mrs. Jarol:

Dolomite is not considered a strong chemical fertilizer but is more in the class with lime. It is a lime that is strong in magnesium. We are not in favor of the frequent application of such things as dolomite or phosphate rock. Where a farm or piece of land is run down, a good application of it should be sufficient for ten years. The tendency should be to increase the fertility of the soil through compost. You may use dolomite or phosphate rock in the compost heap in place of lime.

We will try and print a list of alkaline and acid plants some time in the spring. However, where you use plenty of compost, you do not have to worry as to acidity or alkalinity of the soil. The compost will take care of it. On the other hand, if a piece of land is excessively acid, it might be neutralized by the application of lime or dolomite.

Strange as it may seem, a certain amount of slugs are desirable in the organic scheme. Where the ground is conditioned in an organic manner, nature will take care of this situation and reduce the oversupply.

The best kind of lime for the compost heap is hydrated lime. If the bag reads hydrated lime, you do not have to worry about fillers. It will not contain any strong chemicals. Usually the strong chemical fertilizers have fillers.

Gentlemen:

Kindly give me information on the following: I note that you do not object to the use of raw ground phosphates. Under what name and where can same be bought, to what extent will they increase the phosphorus content of the soil to prevent an overbalance of nitrogen; and is it best to apply the phosphates to a compost or directly to the soil? Also, should lime be applied directly to the soil or should it go into a compost pile?

Oliver Lawrence,
Jackson Heights, L. I., N. Y.

Answer

Dear Mr. Lawrence:

The only place where we know that raw ground phosphate can be purchased is the Ruhm Phosphate Co., Mt. Pleasant, Tennessee.

Where a farm or a piece of land is run down, we would suggest that some of the phosphate be applied direct to the land along with being used in the compost heap. Ordinarily it is best to use it as a substitute for lime in the compost heap. The same theory applies to the application of lime. Naturally where you use ground phosphate rock on the land, it gives you an excess of phosphate and you can make up for it by getting your nitrogen from rotted manure and your potash from wood ashes.

Dear Mr. Rodale:

When HEALTH GUIDE carried it's first article concerning chemical fertilizer and it's effect on the soil, I knew that here at last was something I had long been waiting for. I followed with interest the articles subsequently carried in FACT DIGEST. I applied and received in due course the pamphlet describing the Indore Method of Composting. When you made known your intentions of publishing a magazine dealing exclusively on this subject, my joy knew no bounds and I immediately subscribed in order not to miss a single issue. I also have Sir Albert's enlightening book, AN AGRICULTURAL TESTAMENT.

For some time now there has been considerable talk on post-war planning, dealing with various subjects, among which of not the least importance is Health. Knowing as I do how our health depends on foods grown in a healthy soil, I feel that now is the time to bring before the public the truths that appear in "Our" magazine and spread the great work you are already doing. How this can be achieved, has from time to time, been suggested in Reader's Correspondence and now I would like to offer my suggestion in the hope that I may be partly instrumental in revealing to the people, facts vital to the health of every man, woman and child. A greater circulation of your magazine is one answer to this problem; especially to those directly connected to agriculture.

Here in Canada a program is being carried on, known as National Farm Radio Forum, sponsored by The Canadian Broadcasting Corporation, The Canadian Federation of Agriculture and The Canadian Association for Adult Education. Through the medium of the radio, listening groups composed of local Farm Forums, listen in once a week (Monday night) to Farm Forum broadcasts and discuss among themselves the points which the broadcast brings up. These discussions relating to social and economic problems of agriculture, are later reported by the local Forum Secretary to the Provincial Sec., who in turn reports to National Forum Headquarters, located in Toronto, Ont. The Provincial Sec. reports back to the local groups, opinions expressed in the previous broadcast. In this way Forums throughout the country receive National recognition of their findings.

With your permission and that of the Provincial Farm Forum Secretary, I suggest that in his reports back to local Forums to enclose with them subscription blanks to ORGANIC GARDENING for their convenience. If this idea could be put into practice a greater circulation among farmers should result. I believe many farmers here would be glad to put into practical use your natural methods of farming; at least, I think, they would be willing to advocate the Organic method of farming for post-war agriculture.

Wilfred H. Hodgson,
Saint John, N. B., Canada.

We have two city lots with a frontage of 114 feet and a depth of 145 feet. One of the lots is used for lawn and the other is used for garden, berries and a small chicken lot. How much compost should I use on the place?

I shall be glad for any advice you may give me.

Joseph W. Wiley,
Anderson, Indiana.

Answer

Dear Mr. Wiley:

Replying to your recent letter, the way to figure how

much compost you need is to take the area that you want to cover and figure to cover it, let us say, with one half inch of compost. You can then, by figuring out the cubic footage required, figure out the size of your compost heap.

It all depends how much material you have available. You may have sufficient to cover it. In our opinion for the small vegetable garden, however, we would not cover the whole garden but would put the compost only in the trenches that you would make where you would plant your bed. Why waste compost for the aisles where the weeds have their field day?

Dear Sirs:

Your magazine has interested me greatly this past year, especially as I used a modification of composting some years ago on a Long Island back yard that was mostly sand and grew blue ribbon winning flowers on it.

I have a large lot in a select development on which I have a fair-sized garden. This spring was my first planting on this ground. The ground was mostly gravel when I had it plowed up. One yard of barnyard manure and two of humus were put on. I used some phosphate as there was no compost ready to put on. The garden crop was fair for me, best in the community, but I hope to do much better next summer. I have two compost heaps 4' x 10' x 4 ft deep.

Not having cows and horses, etc. to make barnyard manure for the compost heaps I bought 200 lbs. of tankage and 200 lbs. of sheep manure. The tankage made me a lot of enemies and I have had to cover both heaps completely with dirt to keep down the unpleasant odors.

With your reference to odorless results in chicken pens when using earthworm pits for the droppings I wonder why I could not dig a pit some 6 ft. deep by 4 ft. wide and 6 to 10 ft. long and cover it with planking for composting use. Into this pit I would build up the composting material the same as in the mounds. I would plant earthworms in the pit and let them work over the composting material for me throughout the winter.

The covered pit should allow sufficient heat to remain in the composting material so that it will work all winter instead of lying dormant. All my composting material is built up gradually during the summer with lawn clippings and in the fall with dried leaves. I am thinking of mowing weeds on vacant lots and using those for the compost heaps. At best, I can only complete the heaps by fall and if the material is ready for use in May and June it must work during the winter.

Completing the heaps by fall does not permit me to turn them until cold weather or wait till spring. Building the compost heaps above ground makes them unsightly for small yards in residential developments and fastidious neighbors are always annoyed because of odors and possibilities of flies. For this reason I believe perhaps the pit, suitably covered, might do the job for the suburban home owner who likes to putter around with dirt and growing things.

M. S. Beard,
Manhasset, L. I.

Answer

Dear Mr. Beard:

I think your idea of making a pit for the winter time is an excellent one. In order, however, to be able to turn the heap when there is a spell of warm weather during the winter, you might want to make the pit a little longer than needed and leave some empty space in which you could place the compost that you turned. Covering it with planks may not be sufficient to prevent freezing, so we would suggest that underneath the planks and on top of the heap, you put some horse manure. Horse manure has the characteristic of heating and it would keep the compost underneath it warm.

I do not believe that earthworms would immediately take away the odor from such material as tankage. They may in time, but in the meanwhile there would be a bad odor unless, of course, your compost was made in a pit and covered.

Dear Mr. Rodale:

You will, I know, be interested in the enclosed extract from a letter which has just reached me. The fact that India is following in the footsteps of South Africa and inaugurating a scheme for the making of compost on a large scale marks another great advance in the soil fertility campaign.

I am also enclosing a reprint dealing with a Scotch scheme for tackling animal disease from the soil end—prevention. You may like to use this paper for a forthcoming issue of *Organic Gardening*. A similar

scheme is being worked out for England.

Sir Albert Howard,
London, (England).

Copy of a letter dated Aug. 24th 1943 to Sir Albert Howard from Dr. C. N. Acharaya, Chief Biochemist, Imperial Council of Agricultural Research, India.

You will be interested to know that the Government of India have recently launched an all-India scheme for the preparation of compost-manure from urban refuse and have sanctioned an allotment of about Rs. 2½ lakhs of rupees for the purpose. The scheme is to be operated by the Imperial Council of Agricultural Research and the above grant would be apportioned among the different provinces and states in India for the purpose of training special officers (Provincial or State Compost Biochemists) in the technique of compost-making from urban wastes, and for the organizing the preparation of compost-manure at selected municipal centres in the respective Provinces and States. I have the honour of being selected for the office of Chief Biochemist to the Imperial Council of Agricultural Research, who would be in charge of training the Provincial and State Biochemists and later, in supervising their work. The Headquarters of the new scheme have been established at Nagpur, being geographically a central place, from which easy access could be had to all parts of India.

As I am getting together all available literature relating to compost and organic manures, for passing on the information to the Provincial and State Biochemists working under me in all parts of India, I should very much value it if you could kindly let me have available copies of all your papers and lectures on the subject, in addition to the publications issued by the County Palatine of Chester Local Medical and Panel Committee.

Organic Gardening:

I was out in the country most of the summer and early fall. After picking fruit (apples, crabapples, pears, plums, and grapes) for nearly two months, I began to wonder how people can eat all the lead, arsenic, sulphur, bordeaux and other sprays and be even half-well.

Regarding the mulching of apple orchards at Mass. State College, the practice seems to make the trees grow vigorously and produce abundantly, but it was always easy to tell which trees had been sprayed and which had not; the *unsprayed* ones invariably had very poor fruit.

The poor showing of unsprayed trees throws a bit of doubt on E. H. Faulkner's claims for the disease and pest repelling value of mulching. But it is of course possible that the occasional lone unsprayed trees were growing in soil that had been poisoned by seepage from the surrounding soil. A natural organic mulch is of great value but it plainly is not a cure for all pests and diseases unless other conditions are good too.

Mr. A. C. Ballard, the supt. of the orchards, said that apple trees that were constantly kept sprayed all during their prebearing years, need more care later on. This suggests that spraying either weakens the tree's resistance to disease or poisons the soil, or both.

The mulch is applied whenever material is available. The grass and weeds that grow up through the mulch are mowed twice a year, (usually early summer and early fall) and allowed to lie where they fall.

The mulch makes a fine cushion for the windfalls or drops to fall on. It also apparently stops erosion. I saw nothing to indicate either wind or water erosion on mulched areas.

R. S. Moller,
Hempstead, L. I.

Answer

Dear Mr. Moller:

Replying to your letter, mere mulching of fruit trees is not enough. First a compost must be placed under the tree and perhaps dug in very slightly. Then above this compost should be placed the straw or hay mulch. After all, the roots of the tree must be fed on some fertilizer which in this case is all organic. The effect of using such organic material on fruit trees probably would not be felt for quite a number of years. With trees it is a long process.

Dear Sirs:

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Please, also, let me know your estimate of the value of

pig manure in comparison with other manures.

R. H. McFarlane,
Springfield, Mass.

Answer

Dear Mr. McFarlane:

Replying to your letter of November 24th, to protect your compost pile for the winter it would be good to cover it with a mulch of some plant material of straw or hay or to cover it with canvas if you have it. Otherwise, it should be put under cover of a shed. Where you have only a limited amount of compost, it should be spaded into the top four or five inches of soil.

Pig manure is considered better than cow or horse manure.

Dear Sir:

Received and noted your comments relative to the views which I expressed in my recent letter.

For your information, would mention that I have been employing composts since the winter of 1939-1940—finding the most satisfactory results when sufficient moisture is available, and soil as well as manure or manure substitutes are added in building up the heaps. Last year I had about 9 tons of matter which was applied to about 5/8 acre of truck and vegetable garden. The crop results speak for themselves as compared to plots not treated in this manner.

Basically you are correct in that properly prepared humus aids in offsetting the effects of a drought—but bear in mind that from May to September 1943, there was a deficiency of 12 inches of rainfall. While my crops were not failures, yet, when studying the water requirements of plants, you certainly wouldn't want me to believe that humus is, by itself, a miracle addition to the soil, which would eliminate the need of rainfall, or the employment of irrigation.

In one of my reference books I have found the following table, which might be of interest to you in computing the weight of compost that has been decomposed, and made up with vegetable matter, soil and manure:

1 cu. ft. of half rotten stable manure will weigh 56 lbs.; if coarse or dry, 48 lbs.

When first building up the heap, I usually figure on 500 cu. ft. of vegetable matter to the ton; and then, after the heap has become settled with the soil and manure worked into it, the above rule is applied —and for a rule of thumb, is reasonably accurate.

I fully appreciate that present day war conditions would interfere with your efforts to promote composting practices; yet, the unavailability of animal manures, to Victory Gardeners, makes it almost necessary to resort to the use of chemical fertilizers.

It has been my pleasure to observe organic gardening as practiced by my grandfather, who was a genius in the art of producing prime vegetables and flowers.

Also, during the past season, to compare the crop yields from my own plot, as well as that on a nearby farm, whose owner very religiously produces a reasonable volume of barnyard manures; with those on other properties, where commercial fertilizers were relied upon. The balance naturally favored manures and composts. Although I am using commercial fertilizers along with the compost.

However much I would like to try the organic method alone to see just what results would be achieved yet the surrounding conditions make this course inadvisable, as I am unable to obtain sufficient animal manures or animal wastes to furnish the required plant nutrients to the growing crops.

John W. Rothenhoefer,
Frederick, Md.

Answer

Dear Mr. Rothenhoefer:

Replying to your letter of November 25th, you state that you have to use chemicals because you cannot obtain manure. There are natural substitutes for chemicals which you can use, however, such as bonemeal, tankage, dried blood, kitchen wastes, etc. You don't need much of this animal material.

Humus does not eliminate the need for rainfall but actual experiences have shown that where the crops of some farmers were completely ruined by the drought, that others who had their ground enriched with compost, actually had a good crop. Where irrigation has to be resorted to, that is a different question.

Don't forget that Victory gardeners can buy such things as sheep and cow manure in the seed stores. There seems to be plenty of this available. There are also all kinds of peat humus and peat moss that can be purchased.

Gentlemen:

Recently I heard Carlton Fredricks make the statement

over the radio that vegetables and fruits grown on soil low in iron were very poor in iron, please tell me in what way is iron added to the soil. Does turning under winter legume crops and other green manure crops add iron, also the materials from a compost pile?

Is cottonseed meal good organic gardening practice and what would one get other than phosphorous?

Mrs. Thos. G. Duncan,
Vicksburg, Miss.

Answer

Dear Mrs. Duncan:

It is not necessary to attempt to put any one particular element in the soil. If you can use a variety of materials consisting of manure and green matter consisting of weeds, grass, and leaves, you will have sufficient of all elements required. This is true over a period of a few years. Some people have put rusty bits of iron in the soil and in some cases they have obtained iron filings from machine shops and put it in the soil. The dangerous thing there is that too much iron may be absorbed. It is an artificial way and as such has a certain element of danger.

The turning under of legume crops or other green manure crops will help in the general plan of adding soil food, but the best way is to make compost and let it decay thoroughly. You then need not worry about any element, even though the green material that you get comes from a soil that may be deficient in anyone of those elements such as iron.

Cottonseed meal contains nitrogen, phosphoric acid and potash, as well as many other needed elements in small amounts. It should be composted before using.

Dear Mr. Rodale:

Anent feathers in the compost heap may I take issue with you as to the time required to break them down. Dry feathers (Oct. Organic Gardening) are practically indestructable but if kept wet they are something else "once again". Properly placed in a compost heap they will, like the rest of the heap, soon lose their identity completely. Late in Sept.—1943—I was commencing to compost several cubic yards of Bermuda grass roots and stems. I had very little animal refuse to add as an activator but I did have the feathers from some sixty or seventy chickens. These feathers, well wetted, I placed in a rather compact mass in one portion of the heap. Over these I spread a very thin layer—about an inch I think—of fresh chicken droppings. When the heap was turned about four weeks later the feathers were in a well advanced state of decomposition. When the heap was returned a few days ago I was able to find but one small fragment that looked at all like feathers. They had lost all semblance of coherence. I have no hesitation in saying that they respond to bacterial action much more readily than the other elements—other than the scant amount of chicken manure—of my compost heap. I would gladly use more feathers, if I could get them, as an activator in the compost heap. My opinion is that they need to be quite wet when placed in the heap. Again some of the entrails or droppings will tend to hasten the decomposition. At any rate a very few months should prove ample to reduce chicken feathers, properly handled, to a very valuable humus.

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Thos. J. Barrett,
Earthmaster Farms, Box C-10, Roscoe, Calif.

COMPOST—And How To Make It

A phamphlet of 64 pages answering many questions about the best way to make compost. This book consists of material that has appeared in Organic Gardening from time to time.

50c Postpaid — Foreign 70c

Organic Gardening
Emmaus, Pa.

These feathers, whatever other elements they may carry, certainly are rich in nitrogen. Some 35 years ago I was dressing a good many chickens. Before I learned that the dry feathers had a market value I was in the habit of throwing the wet feathers in a corner under a shed. In a short time the compact mass some three feet deep began giving off a stiffling odor of ammonia. Had I left the heap alone, I dare say a good humus would have resulted in a very few months. Unfortunately I was not interested in humus. I dug a pit and buried the mass. After that I took measures to dry and market the feathers.

The bermuda roots and stems that I refer to above make a very desirable humus. Since all lawns, in Southern California, soon become practically 100% bermuda, there is an immense amount of valuable compost thrown away yearly.

The bermuda grass sends out long stems along the ground. Every joint will take root and, if left to itself, will soon make a thick, tangled mat. "Renovators" with rapidly rotating knives are used to tear this tangled mat to shreds which are raked off. It is hauled off to the river bank where it becomes 100% loss.

C. N. Stearns,
Santa Ana, Calif.

Answer

Dear Mr. Stearns:

Thank you very much for your very fine letter. No doubt our trouble has been lack of wetting of the feathers and we are extremely glad to learn of this valuable point.

Organic Gardening:

Will you give me the names of Organic Farmers from whom I can buy wheat, corn, rye and other grains in quantity? I am buying a mill fashioned after the old water mill but refined and glorified; stones 9 inches in diameter instead of about 4 ft. and produces whole grain flour and meal superior to that made by the great mills of the United States and the world.

My tenant who has been reading my Organic Gardening magazine has bought a farm and subscribed for Organic Gardening and will use humus instead of commercial fertilizer. I will give him a starter of worms for a Christmas present.

Do you know how to bring out the "nut-like" flavor in whole wheat bread? My aunt did it for me and the family 80 years ago when I was a very little boy.

W. T. Chafin,
776 Pope,
Memphis, Tenn.

Answer

Dear Mr. Chafin:

We are reprinting your letter in ORGANIC GARDENING. Perhaps you may get answers from some of our readers. My suggestion is that you contact farmers in your section and get them to grow wheat organically with the understanding that you would pay them a premium for it. No matter where you would buy wheat grown by compost, it would require a premium and would be well worth it.

I am sure that many readers of our magazine, who see this letter, will be encouraged to raise wheat by the organic method and sell it through concerns such as yours. If there are any other persons located

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in various parts of the country who are interested in buying such wheat, it might not be a bad idea to have a sort of clearing house through our magazine.

Regarding the question of the nut-like flavor in whole wheat bread, would suggest that you write to Mrs. Mildred Jensen Loomis, as she is an authority on bread baking. Her address is Lane's End, Brookville, Ohio.

Dear Mr. Rodale:

Your reply to Mr. Rothenhoefer in Organic Gardening for December 1943 seems adequate and to the point.

I don't know of a single instance whereby a farmer, always supposing he is willing to exercise his tail feathers, cannot obtain a substantial supply of weeds for composting. I have seen farmers turn down offers from their neighbors of manure for the cost of trucking it away. Yet these same farmers will think nothing of spending one hundred dollars more or less for chemical fertilizers.

To such farmers I recommend a visit to a local greenhouse. Upon inquiry they will learn that one of the principal items of overhead in a greenhouse is the seasonal change of soil. The bench soil in a greenhouse undergoes the process of forcing. Plants must be brought to maturity or in bloom outside their natural season. This is done by the use of chemical fertilizers, heat, water and sunlight. After a season or two the soil has to be dumped and fresh soil taken in.

It was my hard luck to learn this the hard way. One day I passed a lot and saw a hill of the richest looking black loam I had ever seen. I bagged a good load of it. That stuff wouldn't grow a blade of grass. When I passed the same place again I noticed a greenhouse nearby and it did not take me long to piece the story together. I had bagged a good load of exhausted soil that had been discarded by the greenhouse.

Herman Schaeffer,
New York, N. Y.

Mr. J. I. Rodale, Editor
Organic Gardening
Emmaus, Pennsylvania
Dear Mr. Rodale:

Your inquiry of December 18 relative to composting has been referred to this laboratory by the Northern Regional Research Laboratory for any additional information that we might have.

Our program of research on composting, as originally contemplated, has been held in abeyance temporarily because of the greater war significance of certain other projects. Consequently we have nothing of interest to report at this time on the subject of composting. The matter of possible cooperative work between this laboratory and your organization can best be considered at such time when our composting research is resumed.

We would appreciate an opportunity of seeing a copy of the December issue of your magazine.

Very truly yours,
Howard D. Lightbody,
Chief, Biochemical Division.

Answer

January 3, 1944.
Howard D. Lightbody
Chief, Biochemical Divis.
U. S. Dept. of Agriculture
Bureau of Agric. and Industrial Chemistry
Western Regional Research Lab.
Albany, 6, Calif.
Dear Mr. Lightbody:

Replying to your letter of December 28th, we are sending you a sample copy of ORGANIC GARDENING. I hope that your organization could soon find time to experiment in the making of compost heaps organically without the use of strong chemicals.

Dear Sir:

In reply to yours of Jan. 4, would say that I purchased earthworm capsules, as it did not seem practical to bring earthworms such a long distance.

The first lot did not bring forth any worms, so I wrote the Earthworm people about it and they sent me some more.

I followed their directions very carefully, but even the second lot did not materialize. This second lot was a rather hard mass, and held its shape and did not seem to combine with the box of earth in which I placed the capsules.

Arthur J. Ball,
Bloomfield, N. J.

Answer

Dear Mr. Ball:

Regarding your experience with capsules, we have had the same results, but have done very well when we have purchased the earthworms. If you would like to try again, would suggest that you purchase the earthworms direct from the Ohio Earthworm Farm, as they are much nearer to you and those are the worms that we are using.

AN AGRICULTURAL TESTAMENT

By Sir Albert Howard, C.I.E., M.A.
Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

Sir Albert Howard C. I. E., M. A.

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